Jurnal Elektronika dan Telekomunikasi

Volume 20, Number 1, August 2020

e-ISSN: 2527-9955; p-ISSN: 1411-8289

Abstract Index

M. Reza Hidayat[a], Mohamad Hamzah Zamzam[a], Salita Ulitia Prini[b] ([a]Department of Electrical Engineering, Universitas Jenderal Achmad Yani, [b]Research Center for Electronics and Telecommunication, Indonesian Institute of Sciences)

Excitation Analysis of Transverse Electric Mode Rectangular Waveguide

Jurnal Elektronika dan Telekomunikasi, August 2020, e-ISSN: 2527-9955, p-ISSN: 1411-8289, Vol. 20, No. 1, pp. 1 - 8.

A waveguide is a transmission medium in the form of a pipe and is made from a single conductor. A waveguide has the function of delivering electromagnetic waves with a frequency of 300 MHz - 300 GHz and is able to direct the waves in a particular direction. In its development, a waveguide can be used as a filter. A filter consists of several circuits designed to pass signals that are generated at a specific frequency and attenuate undesired signals. One type of filter that can pass a signal in a particular frequency range and block signals that are not included in that frequency range is a bandpass filter. In this article, we study a rationing analysis on rectangular waveguide using TEmn mode followed by an implementation of a bandpass filter in the frequency range of 3.3-3.5 GHz for S-Band Wireless Broadband and Fixed Satellite. The observation process is done by shifting the position of the connector (power supply) as much as five times the shift to get the results as desired. Based on the analysis of the simulation process using Ansoft HFSS software, it is observed that the optimized results of the rectangular waveguide mode TE10 were obtained at a distance between connectors of 30 mm with a cut-off frequency of 3.3 GHz, the value of the return loss parameter of -34.442 dB and an insertion loss of -0.039 dB. Whereas, the optimized TE20 mode can be obtained at a distance of 70 mm between connectors, with a cut-off frequency of 3.5 GHz, the value of the return loss parameter of -28.718 dB and an insertion loss of -0.045. The measurement of TE10 mode in our Vector Network Analyzer (VNA) shows a cut-off frequency of 3.2 GHz, with a value of the return loss of -18.73 dB and an insertion loss of -2.70 dB. Meanwhile, a measurement of TE20 mode results in a cut-off frequency of 3.2 GHz, with a value of the return loss of -5.89 dB and an insertion loss of -4.31 dB.

Keywords: Filter, Frequency, Insertion Loss, Rectangular Waveguide, Return Loss.

Bidadariana Yunia Utami Putri[a], Eka Setia Nugraha[a], Anantia Prakasa[a], Subroto Fajar Siddiq[b] ([a]Fakultas Teknik Telekomunikasi dan Elektro, Institut Teknologi Telkom Purwokerto, [b]Center for Technology and Innovation Division, PT. Len Industri (Persero))

Design and Performance Analysis of Linear Array Microstrip Antennas with Mitered-Bends Feeding Network for X-Band Radar Applications

Jurnal Elektronika dan Telekomunikasi, August 2020, e-ISSN: 2527-9955, p-ISSN: 1411-8289, Vol. 20, No. 1, pp. 9 - 15.

To accurately detect objects, the radar antenna must have a high gain for the desired range. The antenna uses an array method to increase the gain. It has a unidirectional radiation pattern to meet the X-band radar implementation as a ship navigation tool. The X-band radar works at high frequencies. Thus, it will be more sensitive in detecting small particles, including rain particles. The use of a mitered-bends feeding network method by cutting the 90-degree curve is to maximize the power transmitted to reduce losses. This method spreads the bandwidth of the antenna. The antenna is designed and fabricated into a linear array of 8 elements, using the R04003C Rogers substrate with a microstrip line supply. This study limits up to 8 elements of radiation, followed by the addition of a method to expand the bandwidth of antennas. Considering material limitation and duration of antenna design. The final antenna dimensions are 142.40 mm × 42.8 mm. The measuring results show fc = 9.496 GHz, S11 = -32.64 dB, VSWR 1.05, bandwidth = 41.9 MHz (9.5159 GHz - 9.4740 GHz), and gain 8.8 dB as well as a linear polarized antenna with unidirectional pattern direction. The radar antenna tends to have a narrow beamwidth and high gain.

Keywords: X-band radar, microstrip antennas, linear array, mitered-bends, gain, unidirectional.

Arnez Pramesti Ardi[a], Ilham Sukma Aulia[a], Rizki Ardianto Priramadhi[a], Denny Darlis[b] ([a]School of Electrical Engineering, Telkom University, [b]School of Applied Science, Telkom University)

VLC-Based Car-to-Car Communication

Jurnal Elektronika dan Telekomunikasi, August 2020, e-ISSN: 2527-9955, p-ISSN: 1411-8289, Vol. 20, No. 1, pp. 16 - 22.

Based on data from the Indonesian Traffic Corps by September 2019, the number of car accidents was dominated by rear-hit crashes with 6,966 accidents. Most of these accidents occurred during car convoys. It needs a car-to-car communication to increase driver awareness. One of the technologies that can be applied is Visible Light Communication (VLC) and infrared communication. The transmitted data are the vehicle speed data, throttle position, and brake stepping indicator. The data are obtained by reading the Engine Control Unit (ECU) in the car. The data are packaged from the three data and sent to other cars at day and night using VLC and infrared communication. The experimental results show that in a communication system that uses VLC, data can be exchanged between cars during the day up to 2 meters and at night up to 11 meters. Otherwise, in infrared communication, vehicles can communicate during the day up to 2 meters and at night up to 0.7 meter. The test was also carried out with some conditions such as rain, smoke, passers, and other vehicle lights.

Keywords: Car-to-Car Communication, ECU, Visible Light Communication, Infrared Communication.

Deborah Augustine[a], Erlyta Septa Rosa[b], Niki Prastomo[c], Shobih[b] ([a]Department of Physics Energy Engineering, Surya University, [b]Research Center for Electronics and Telecommunication, Indonesian Institute of Sciences (P2ET-LIPI), [c]Department of Physics Engineering, Universitas Multimedia Nusantara)

Optimization of Titanium Dioxide Nanoparticles in Mesoporous Electron Transport Layer Perovskite Solar Cell

Jurnal Elektronika dan Telekomunikasi, August 2020, e-ISSN: 2527-9955, p-ISSN: 1411-8289, Vol. 20, No. 1, pp. 23 - 28.

Research about mesoporous TiO2 as an electron transport layer in perovskite solar cell has been done to obtain the best fabricated cell's performance. In this research, the concentrations of opaque and transparent TiO2 nanoparticle were varied, in order to optimize the TiO2 mesoporous electron transport layer in FTO/CL-TiO2/MS-TiO2/Perovskite/P3HT/Ag perovskite-based solar cell. Morphological, optical, and electrical characteristics of TiO2 layers were investigated using scanning electron microscopy (SEM), four-point probe (FPP), and UV-Vis spectroscopy. The influences of those characteristics in solar cell performance were analyzed by using illumination of sun simulator with a light intensity of 500 W/m2. The results showed that transparent TiO2 has a higher conductivity and transmittance compared to the opaque TiO2. The concentration of TiO2 solution in 1:17 ratio resulted in higher electrical performance in both the transparent and opaque TiO2 layer. The best perovskite solar cell performance with PCE of 0.37% was achieved from the sample using TiO2 transparent layer with a concentration of 1:7 ratio.

Keywords: mesoporous TiO2, electron transport layer, perovskite solar cell.

R. Sandra Yuwana[a], Fani Fauziah[b], Ana Heryana[a], Dikdik Krisnandi[a], R. Budiarianto Suryo Kusumo[a], Hilman F. Pardede[a] ([a]Research Center for Informatics, Indonesian Institute of Sciences, [b]Research Institute for Tea and Cinchona, Indonesian Agency for Agricultural Research and Development)

Data Augmentation using Adversarial Networks for Tea Diseases Detection

Jurnal Elektronika dan Telekomunikasi, August 2020, e-ISSN: 2527-9955, p-ISSN: 1411-8289, Vol. 20, No. 1, pp. 29 - 35.

Deep learning technology has a better result when trained using an abundant amount of data. However, collecting such data is expensive and time consuming. On the other hand, limited data often be the inevitable condition. To increase the number of data, data augmentation is usually implemented. By using it, the original data are transformed, by rotating, shifting, or both, to generate new data artificially. In this paper, generative adversarial networks (GAN) and deep convolutional GAN (DCGAN) are used for data augmentation. Both approaches are applied for diseases detection. The performance of the tea diseases detection on the augmented data is evaluated using various deep convolutional neural network (DCNN) including AlexNet, DenseNet, ResNet, and Xception. The experimental results indicate that the highest GAN accuracy is obtained by DenseNet architecture, which is 88.84%, baselines accuracy on the same architecture is 86.30%. The results of DCGAN accuracy on the use of the same architecture show a similar trend, which is 88.86%.

Keywords: Tea diseases detection, augmentation data, GAN, DCGAN.

Jurnal Elektronika dan Telekomunikasi

Volume 20, Number 1, August 2020

e-ISSN: 2527-9955; p-ISSN: 1411-8289

Author Index